

1652



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## RAW SEQUENCE LISTING

PATENT APPLICATION: US/10/671,207

DATE: 01/21/2004

TIME: 12:30:57

Input Set : N:\Crf3\RULE60\10671207.RAW.txt  
 Output Set: N:\CRF4\01212004\J671207.raw

1 <110> APPLICANT: O'Donnell, Michael E.  
 2 Yuzhakov, Alexander  
 3 Yurieva, Olga  
 4 Jeruzalmi, David  
 5 Bruck, Irina  
 6 Kuriyan, John  
 7 <120> TITLE OF INVENTION: ENZYMES DERIVED FROM THERMOPHILIC ORGANISMS THAT  
 8 FUNCTION AS A CHROMOSOMAL REPLICASE, PREPARATION AND  
 9 USE THEREOF  
 10 <130> FILE REFERENCE: 22221/1030  
 11 <140> CURRENT APPLICATION NUMBER: 10/671,207  
 12 <141> CURRENT FILING DATE: 2003-09-25  
 13 <150> PRIOR APPLICATION NUMBER: US/09/716,964  
 14 <151> PRIOR FILING DATE: 2000-11-21  
 15 <150> PRIOR APPLICATION NUMBER: 60/143,202  
 16 <151> PRIOR FILING DATE: 1997-04-08  
 17 <150> PRIOR APPLICATION NUMBER: 08/823,407  
 18 <151> PRIOR FILING DATE: 1997-04-08  
 19 <150> PRIOR APPLICATION NUMBER: 09/057,416  
 20 <151> PRIOR FILING DATE: 1998-04-08  
 21 <160> NUMBER OF SEQ ID NOS: 212  
 22 <170> SOFTWARE: PatentIn Ver. 2.1  
 24 <210> SEQ ID NO: 1  
 25 <211> LENGTH: 2007  
 26 <212> TYPE: DNA  
 27 <213> ORGANISM: Thermus thermophilus  
 28 <400> SEQUENCE: 1  
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 31 actagccttg tgagcgcctt ctaccgcgc ttccggcccc tcaccttcca ggaggtggtg 180  
 32 gggcaggagc acgtgaagga gcccctctc aaggccatcc gggaggggag gctcgcccg 240  
 33 gcctacctct tctccggggc cagggcgtg ggcaagacca ccacggcgag gctcctcgcc 300  
 34 atggcgtgg ggtgccaggg ggaagacccc cttgcgggg tctgccccca ctgcccaggcg 360  
 35 gtgcagaggg ggcgcaccc ggacgtggg gacattgacg cccgcaccaa caactccgtg 420  
 36 gaggacgtgc gggagctgag gggaaaggatc cacctcgccc ccctctctgc ccccgaggaag 480  
 37 gtcttcatcc tggacgaggc ccacatgtc tccaaaagcg cttcaacgc cttctcaag 540  
 38 accctggagg agccccccgc ccacgtcctc ttgcgtttcg ccaccacca gccccgagagg 600  
 39 atgcccccca ccattccttc ccgcacccag cacttccgt tccggccctt cacggaggag 660  
 40 gagatcgctt ttaagctccg ggcgcacccgtgg ggcggggaggc ggaggaggag 720  
 41 gcccctctcc tcctcgccccg cctggcggac gggccctta gggacgcggaa aagccctctg 780  
 42 gagcgcttcc tcctccttggaa aggccccctc acccggaagg aggtggagcg cggcccttaggc 840  
 43 tcccccccaag ggaccgggggt ggccgagatc gcccctccccc tcgcgagggg gaaaacggcg 900  
 44 gaggcccttgg gcctcgccccg ggcgccttac ggggaagggt acgcggccggag gaggcctggtc 960

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 46 cccctcccg ccccgccccca gcccctgatc gcccctgatc cggccctgga cgaggccatg 1080  
 47 gagcgcctcg cccgcgcctc cgacgcctta agcctggagg tggccctcct ggaggcggga 1140  
 48 aggccctgg ccgcccggc cctaccccaag cccacggcg cttcggccttcc agaggtcggc 1200  
 49 cccaaaggcg aaagcccccc gaccccgaa ccccaaggc cccggaggc gcccaccc 1260  
 50 cgggagcggt ggcgggcctt cctcgaggcc ctcagccca ccctacggc cttcgtgcgg 1320  
 51 gagggccggc cggaggcccg ggaaggccag ctctgcctcg ctttccccca ggacaaggcc 1380  
 52 ttcactacc gcaaggcctc ggaacagaag gtgaggctcc tccccctggc ccaggccat 1440  
 53 ttcgggtgg aggaggctgt cctcgctctg gaggagaaa aaaaaagccct gagcccaagg 1500  
 54 ccccgccccg ccccacccctc tgaagcgccc gcaccccccgg gcccctccga ggaggaggt 1560  
 55 gagcggagg aagcggcgga ggaggccccg gaggaggcct tgaggcggtt ggtccgcctc 1620  
 56 ctgggggggc gggtgctctg ggtgcggcg cccagaccc gggaggcgcc ggaggagggaa 1680  
 57 cccctgagcc aagacgagat aggggtact ggtatataat gggggcatga cgcggaccac 1740  
 58 cgacctcgga caagagaccg tggacaacat cctcaagcgc ctccggcgta ttgagggcca 1800  
 59 ggtgcggggg ctccagaaga tggtgccgaa gggccggggc tgcgacgagg tcctcaccc 1860  
 60 gatgaccgccc accaagaagg ccatggaggc ggcggccacc ctgatcctcc acgagttcct 1920  
 61 gaacgtctgc gccggcgagg tctccgaggc caaggtaac cccaaagaagc ccgaggagat 1980  
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 65 <211> LENGTH: 529  
 66 <212> TYPE: PRT  
 67 <213> ORGANISM: Thermus thermophilus  
 68 <400> SEQUENCE: 2  
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 71 Val Gly Gln Glu His Val Lys Glu Pro Leu Leu Lys Ala Ile Arg Glu  
 72 20 25 30  
 73 Gly Arg Leu Ala Gln Ala Tyr Leu Phe Ser Gly Pro Arg Gly Val Gly  
 74 35 40 45  
 75 Lys Thr Thr Thr Ala Arg Leu Leu Ala Met Ala Val Gly Cys Gln Gly  
 76 50 55 60  
 77 Glu Asp Pro Pro Cys Gly Val Cys Pro His Cys Gln Ala Val Gln Arg  
 78 65 70 75 80  
 79 Gly Ala His Pro Asp Val Val Asp Ile Asp Ala Ala Ser Asn Asn Ser  
 80 85 90 95  
 81 Val Glu Asp Val Arg Glu Leu Arg Glu Arg Ile His Leu Ala Pro Leu  
 82 100 105 110  
 83 Ser Ala Pro Arg Lys Val Phe Ile Leu Asp Glu Ala His Met Leu Ser  
 84 115 120 125  
 85 Lys Ser Ala Phe Asn Ala Leu Leu Lys Thr Leu Glu Glu Pro Pro Pro  
 86 130 135 140  
 87 His Val Leu Phe Val Phe Ala Thr Thr Glu Pro Glu Arg Met Pro Pro  
 88 145 150 155 160  
 89 Thr Ile Leu Ser Arg Thr Gln His Phe Arg Phe Arg Arg Leu Thr Glu  
 90 165 170 175  
 91 Glu Glu Ile Ala Phe Lys Leu Arg Arg Ile Leu Glu Ala Val Gly Arg  
 92 180 185 190  
 93 Glu Ala Glu Glu Ala Leu Leu Leu Leu Ala Arg Leu Ala Asp Gly  
 94 195 200 205

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95 Ala Leu Arg Asp Ala Glu Ser Leu Leu Glu Arg Phe Leu Leu Leu Glu  
96 210 215 220  
97 Gly Pro Leu Thr Arg Lys Glu Val Glu Arg Ala Leu Gly Ser Pro Pro  
98 225 230 235 240  
99 Gly Thr Gly Val Ala Glu Ile Ala Ala Ser Leu Ala Arg Gly Lys Thr  
100 245 250 255  
101 Ala Glu Ala Leu Gly Leu Ala Arg Arg Leu Tyr Gly Glu Gly Tyr Ala  
102 260 265 270  
103 Pro Arg Ser Leu Val Ser Gly Leu Leu Glu Val Phe Arg Glu Gly Leu  
104 275 280 285  
105 Tyr Ala Ala Phe Gly Leu Ala Gly Thr Pro Leu Pro Ala Pro Pro Gln  
106 290 295 300  
107 Ala Leu Ile Ala Ala Met Thr Ala Leu Asp Glu Ala Met Glu Arg Leu  
108 305 310 315 320  
109 Ala Arg Arg Ser Asp Ala Leu Ser Leu Glu Val Ala Leu Leu Glu Ala  
110 325 330 335  
111 Gly Arg Ala Leu Ala Ala Glu Ala Leu Pro Gln Pro Thr Gly Ala Pro  
112 340 345 350  
113 Ser Pro Glu Val Gly Pro Lys Pro Glu Ser Pro Pro Thr Pro Glu Pro  
114 355 360 365  
115 Pro Arg Pro Glu Glu Ala Pro Asp Leu Arg Glu Arg Trp Arg Ala Phe  
116 370 375 380  
117 Leu Glu Ala Leu Arg Pro Thr Leu Arg Ala Phe Val Arg Glu Ala Arg  
118 385 390 395 400  
119 Pro Glu Val Arg Glu Gly Gln Leu Cys Leu Ala Phe Pro Glu Asp Lys  
120 405 410 415  
121 Ala Phe His Tyr Arg Lys Ala Ser Glu Gln Lys Val Arg Leu Leu Pro  
122 420 425 430  
123 Leu Ala Gln Ala His Phe Gly Val Glu Glu Val Val Leu Val Leu Glu  
124 435 440 445  
125 Gly Glu Lys Lys Ser Leu Ser Pro Arg Pro Arg Pro Ala Pro Pro Pro  
126 450 455 460  
127 Glu Ala Pro Ala Pro Pro Gly Pro Pro Glu Glu Val Glu Ala Glu  
128 465 470 475 480  
129 Glu Ala Ala Glu Glu Ala Pro Glu Glu Ala Leu Arg Arg Val Val Arg  
130 485 490 495  
131 Leu Leu Gly Gly Arg Val Leu Trp Val Arg Arg Pro Arg Thr Arg Glu  
132 500 505 510  
133 Ala Pro Glu Glu Glu Pro Leu Ser Gln Asp Glu Ile Gly Gly Thr Gly  
134 515 520 525  
135 Ile  
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139 <212> TYPE: DNA  
140 <213> ORGANISM: *Thermus thermophilus*  
141 <400> SEQUENCE: 3  
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143 cacgtgaagg agcccttcctt caaggccatc cgggaggggaa ggctcgccca ggcctacctc 120  
144 ttctccgggc ccagggcggtt gggcaagacc accacggcga ggctcctcgc catggcggtg 180

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Input Set : N:\Crf3\RULE60\10671207.RAW.txt  
 Output Set: N:\CRF4\01212004\J671207.raw

145 ggggtgccagg gggaaagaccc cccttgcggg gtctgcccc actgccaggc ggtgcagagg 240  
 146 ggcgcccacc cggacgtggt ggacattgac gcccggcagca acaactccgt ggaggacgtg 300  
 147 cgggagctga gggaaaggat ccacctcggc cccctctcg ccccccaggaa ggtcttcatc 360  
 148 ctggacgagg cccacatgct ctccaaaagc gccttcaacg ccctctctaa gaccctggag 420  
 149 gagccccccgc cccacgtcct cttcgcttc gccaccacccg agcccgagag gatgcccccc 480  
 150 accatcctct cccgcaccca gcacttccgc ttccgcccgc tcacggagga ggagatcgcc 540  
 151 tttaagctcc ggcgcacccct ggaggccgtg gggcgggagg cggaggagga ggcctccctc 600  
 152 ctccctcgccc gcctggcggc cggggccctt agggacgcgg aaagcctcct ggagcgcttc 660  
 153 ctccctcctgg aaggccccct caccggagaag gagggtggagc ggcgccttagg ctccccccca 720  
 154 ggaccgggg tggccgagat cgccgcctcc ctcgcgaggg gaaaaacggc ggaggccctg 780  
 155 ggccctcgccc ggcgcctcta cggggaaaggg tacggggcga ggagcctggt ctccggccct 840  
 156 ttggaggtgt tccggaaagg cctctacgcc gccttcggcc tcgcgggaaac ccccttccc 900  
 157 gccccggccc aggcctgtat cgccgcctatg accgccttgg acgaggccat ggagcgctc 960  
 158 gcccgcgcgt ccgacgcctt aagcctggag gtggccctcc tggaggccggg aaggccctg 1020  
 159 gccgcccggagg ccctacccca gcccacgggc gctccttccc cagaggtcgg ccccaagccg 1080  
 160 gaaagcccccc cgaccccgga acccccaagg cccgaggagg cgcggcgcct gcgggagcgg 1140  
 161 tggcgggcct tcctcgaggg cctcaggccc accctacggg ctttcgtgcg ggaggccgc 1200  
 162 cccgaggtcc gggaaaggcca gctctgcctc gtttccccc aggacaaggc ctccactac 1260  
 163 cgcaggcctt cggaaacagaa ggtgaggctc ctcccccggc cccaggccca ttccgggtg 1320  
 164 gaggaggctg tcctcgctt ggagggagaa aaaaaaaagcc tgagcccaag gcccgcggc 1380  
 165 gccccacctc ctgaagcgcc cgcacccccc ggcctcccg aggaggaggt agaggcggag 1440  
 166 gaagcggcgg aggaggcccc ggaggaggcc ttgaggccggg tggccgcct cctgggggg 1500  
 167 cgggtgctct gggtgccggc gcccaggacc cggaggccgc cggaggagga acccctgagc 1560  
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 172 <212> TYPE: PRT  
 173 <213> ORGANISM: Thermus thermophilus  
 174 <400> SEQUENCE: 4  
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 178 20 25 30  
 179 Gly Arg Leu Ala Gln Ala Tyr Leu Phe Ser Gly Pro Arg Gly Val Gly  
 180 35 40 45  
 181 Lys Thr Thr Thr Ala Arg Leu Leu Ala Met Ala Val Gly Cys Gln Gly  
 182 50 55 60  
 183 Glu Asp Pro Pro Cys Gly Val Cys Pro His Cys Gln Ala Val Gln Arg  
 184 65 70 75 80  
 185 Gly Ala His Pro Asp Val Val Asp Ile Asp Ala Ala Ser Asn Asn Ser  
 186 85 90 95  
 187 Val Glu Asp Val Arg Glu Leu Arg Glu Arg Ile His Leu Ala Pro Leu  
 188 100 105 110  
 189 Ser Ala Pro Arg Lys Val Phe Ile Leu Asp Glu Ala His Met Leu Ser  
 190 115 120 125  
 191 Lys Ser Ala Phe Asn Ala Leu Leu Lys Thr Leu Glu Glu Pro Pro Pro  
 192 130 135 140  
 193 His Val Leu Phe Val Phe Ala Thr Thr Glu Pro Glu Arg Met Pro Pro  
 194 145 150 155 160

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195 Thr Ile Leu Ser Arg Thr Gln His Phe Arg Phe Arg Arg Leu Thr Glu  
 196 165 170 175  
 197 Glu Glu Ile Ala Phe Lys Leu Arg Arg Ile Leu Glu Ala Val Gly Arg  
 198 180 185 190  
 199 Glu Ala Glu Glu Ala Leu Leu Leu Ala Arg Leu Ala Asp Gly  
 200 195 200 205  
 201 Ala Leu Arg Asp Ala Glu Ser Leu Leu Glu Arg Phe Leu Leu Leu Glu  
 202 210 215 220  
 203 Gly Pro Leu Thr Arg Lys Glu Val Glu Arg Ala Leu Gly Ser Pro Pro  
 204 225 230 235 240  
 205 Gly Thr Gly Val Ala Glu Ile Ala Ala Ser Leu Ala Arg Gly Lys Thr  
 206 245 250 255  
 207 Ala Glu Ala Leu Gly Leu Ala Arg Arg Leu Tyr Gly Glu Gly Tyr Ala  
 208 260 265 270  
 209 Pro Arg Ser Leu Val Ser Gly Leu Leu Glu Val Phe Arg Glu Gly Leu  
 210 275 280 285  
 211 Tyr Ala Ala Phe Gly Leu Ala Gly Thr Pro Leu Pro Ala Pro Pro Gln  
 212 290 295 300  
 213 Ala Leu Ile Ala Ala Met Thr Ala Leu Asp Glu Ala Met Glu Arg Leu  
 214 305 310 315 320  
 215 Ala Arg Arg Ser Asp Ala Leu Ser Leu Glu Val Ala Leu Leu Glu Ala  
 216 325 330 335  
 217 Gly Arg Ala Leu Ala Ala Glu Ala Leu Pro Gln Pro Thr Gly Ala Pro  
 218 340 345 350  
 219 Ser Pro Glu Val Gly Pro Lys Pro Glu Ser Pro Pro Thr Pro Glu Pro  
 220 355 360 365  
 221 Pro Arg Pro Glu Glu Ala Pro Asp Leu Arg Glu Arg Trp Arg Ala Phe  
 222 370 375 380  
 223 Leu Glu Ala Leu Arg Pro Thr Leu Arg Ala Phe Val Arg Glu Ala Arg  
 224 385 390 395 400  
 225 Pro Glu Val Arg Glu Gly Gln Leu Cys Leu Ala Phe Pro Glu Asp Lys  
 226 405 410 415  
 227 Ala Phe His Tyr Arg Lys Ala Ser Glu Gln Lys Val Arg Leu Leu Pro  
 228 420 425 430  
 229 Leu Ala Gln Ala His Phe Gly Val Glu Glu Val Val Leu Val Leu Glu  
 230 435 440 445  
 231 Gly Glu Lys Lys Pro Glu Pro Lys Ala Pro Pro Gly Pro Thr Ser  
 232 450 455 460  
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 235 <211> LENGTH: 454  
 236 <212> TYPE: PRT  
 237 <213> ORGANISM: Thermus thermophilus  
 238 <400> SEQUENCE: 5  
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 242 20 25 30  
 243 Gly Arg Leu Ala Gln Ala Tyr Leu Phe Ser Gly Pro Arg Gly Val Gly  
 244 35 40 45

RAW SEQUENCE LISTING ERROR SUMMARY DATE: 01/21/2004  
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Input Set : N:\Crf3\RULE60\10671207.RAW.txt  
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**Please Note:**

Use of n and/or Xaa have been detected in the Sequence Listing. Please review the Sequence Listing to ensure that a corresponding explanation is presented in the <220> to <223> fields of each sequence which presents at least one n or Xaa.

Seq#:17; Xaa Pos. 2,3,5  
Seq#:29; N Pos. 6,12,21  
Seq#:30; N Pos. 7,10,19,22  
Seq#:42; N Pos. 7,8,13,14  
Seq#:43; N Pos. 8,9,17,18  
Seq#:66; Xaa Pos. 3,5  
Seq#:67; Xaa Pos. 4,7  
Seq#:68; Xaa Pos. 3,5  
Seq#:89; Xaa Pos. 79  
Seq#:91; Xaa Pos. 47,57

VERIFICATION SUMMARY  
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Input Set : N:\Crf3\RULE60\10671207.RAW.txt  
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L:405 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!  
L:408 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:17  
L:411 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:17  
L:414 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:17  
L:415 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:17 after pos.:0  
L:769 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!  
L:772 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:29  
L:775 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:29  
L:778 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:29  
L:779 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:29 after pos.:0  
L:787 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!  
L:790 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:30  
L:793 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:30  
L:796 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:30  
L:799 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:30  
L:800 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:30 after pos.:0  
L:907 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!  
L:910 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:42  
L:913 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:42  
L:916 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:42  
L:919 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:42  
L:920 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:42 after pos.:0  
L:928 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!  
L:931 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:43  
L:934 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:43  
L:937 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:43  
L:940 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:43  
L:941 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:43 after pos.:0  
L:1141 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!  
L:1144 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:66  
L:1147 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:66  
L:1148 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:66 after pos.:0  
L:1157 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!  
L:1160 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:67  
L:1163 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:67  
L:1164 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:67 after pos.:0  
L:1173 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!  
L:1176 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:68  
L:1179 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:68  
L:1180 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:68 after pos.:0  
L:1650 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:89 after pos.:64  
L:1710 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:91  
L:1715 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:91 after pos.:32  
M:341 Repeated in SeqNo=91  
L:5640 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!  
L:5643 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:193  
L:5646 M:258 W: Mandatory Feature missing, <220> Tag not found for SEQ ID#:193